

REMARKS

The claims previously submitted in the instant application have all been rejected and the action has been made final. Regarding the request to amend the claims as specified in the preceding section of this request for amendment, Applicant has tried to comply with the Examiner's procedural rejections without making substantive changes to the claims as previously submitted. Two new claims have been added. Claim 98 is the result of dividing former multiple dependent claim 72 into two non-multiple dependent claims. New claim 99 is a multiple dependent claim (on claims 55 and 56) wherein a pump is disposed in the output cavity of the heat exchange unit. Applicant submits that a new, substantive examination is not required by the addition of these new claims.

Applicant will also address in these Remarks, substantive rejections by the Examiner and Applicants arguments refuting those rejections.

Claims 92-97 and claim 98

1. "The Examiner has objected to Claims 92-97 under 37 CFR 1.75(c) "...because a multiple dependent cannot be dependent from another multiple dependent claim. MPEP §608.01(n)".
2. Claim 72, the only multiple dependent claim on which claims 92-97 depend, has been amended and made into two, separate dependent claims neither of which is a multiple dependent claim. Newly added claim 98 is now a non-multiple dependent claim (dependent on claim 56 only). Claim 72 has been amended so that it now only depends on claim 55. Claims 92-97 have been amended to include new claim 98.
3. The Examiners rejection cited above having been addressed, Applicant submits that these claims 92-97 are now in a form for examination and allowance.

Claims 52, 55, 68, 75, 77, 81 and 85 and Claims 53, 56, 76, 78, 82, 86

4. In the last paragraph of page 5 of the Examiner's Final Rejection, these claims have been rejected by the Examiner , with regard to Kropa v. Robie, 88 USPQ 478 (CCPA 1951).
5. Applicant has amended each of these claims such that there is a reference in the body of the claim back to the "no reservoir" or "self-contained" limitation, respectively, of the preamble of the claim. Applicant has further amended other relevant claims so that there is reference in the body of claim back to these limitations of the preambles of such claims. Applicant submits that this effectively deals with the first part of the Examiner's objection with respect to Kropa v. Robie
6. Regarding the second part of the Examiner's rejection of these claims with respect to Kropa v. Robie, the Examiner has stated "It has been held that a preamble is denied the effect of a limitation where the claim is drawn to a structure and the portion of the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. Kropa v. Robie, 88 USPQ 478 (CCPA 1951)."
7. The following quotation is taken from the Kropa v Robie case "...Where there inhered in the article specified in the introductory clause a problem whose solution transcended that before prior artisans, the nature of that problem characterizes the elements comprising the article, recited in the body of the claim following the introductory clause, and distinguishes the claim over the prior art. (Case B-26). The introductory clause constituted an essential element in the novelty of the device and constitutes a limitation in the claim." With respect to claims 52, 55, 68, 75, 77, 81 and 85, Applicant has previously pointed out that, prior to the Applicants invention, all liquid cooling systems for electronic systems had reservoirs. To this day, Applicant is not aware of any liquid cooling systems for electronic systems that does not have a reservoir. The elimination of the reservoir is a significant invention and the limitation of "no reservoir" in the preamble is "a problem whose solution transcended that before prior artisans..."

It's (i.e. no reservoir) meaning is clear, unambiguous, and immediately understood to anyone of ordinary skill in the art. Consequently, Applicant suggests that, contrary to the Examiner's assertion, the phrase "no reservoir" in the preambles of these claims is a limitation from which the body of the claim does depend for a complete description of the invention.

8. With respect to claims 53, 56, 76, 78, 82, 86, Applicant again points out that configuring the heat exchange unit in a self-contained unit (with self-contained now more clearly described in the claims) is a problem whose solution clearly solves a problem in the prior art. Applicant has pointed out in his prior amendment Remarks the benefits of such an invention and these are readily apparent to anyone of ordinary skill in the art without explanation. Applicant is aware of no commercial system and no prior art, including Cheon '954, where a self-contained heat exchange unit within the electronic system being cooled has been taught. Consequently the self-contained language, as it now appears is a limitation as it is a problem whose solution transcends that before prior artisans.

Claims 52, 55, 68, 75, 77, 81, and 85

9. These claims have been rejected by the Examiner under 35 USC 112 and 35 USC 102.

10. The Examiner has rejected these claims under 35 USC 112 stating "... contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention." Further, the Examiner has stated "...to the contrary, the figures of the instant application show reservoirs as components of the cooling system. For example, Fig. 2 shows reservoir (206) and Fig. 3 shows reservoir (300 and 312)." Finally, the Examiner has stated that the "... Specification of the instant application does not discuss the absence of the reservoir(s) or any advantages of the cooling system without them."

11. With respect to the Examiner's rejection of these claims under 35 USC 112 and specifically "... contain subject matter which was not described in the specification in such a way as to

enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention”, Applicant responds that a patent specification is not limited to only that subject matter which is explicitly stated in the specification but also the implicit disclosure which the skilled person will add or learn when reading the document or putting its teaching into practice. One skilled in the art, when applying the teaching of the present application, would unambiguously and unequivocally derive the fact that the system does not include any means for storing a reserve of coolant, i.e. it does not include a reservoir. In applying the teaching of the present invention, the resulting system would inevitably result in there being no means for storing a reserve of coolant. Thus, the limitation “no reservoir” is inherently disclosed and the Applicant is entitled to employ it in the claims to distinguish the present invention over the prior art references of record. The foregoing principle of implicit disclosure is particularly applicable in cases where the chosen limitation is in the negative, e.g. “no reservoir”, since such negative limitations are often not explicitly stated. It is also the case that the Applicant is entitled to use a claim limitation, whether implicitly disclosed or explicitly stated, irrespective of whether the specification includes any discussion of the advantages of the feature comprising the limitation. The lack of a discussion of the advantages of such a feature does not negate its existence. Moreover, in this case, Applicant contends, the advantages of “no reservoir” are abundantly clear without explanation. Finally, Fig 3. of the instant application and the description thereof (starting at paragraph. 0065) makes it abundantly clear to one of ordinary skill in the art that there is no reservoir.

12. With respect to the Examiner’s second statement in par. 10 above, a dictionary definition of “reservoir” is – “A receptacle or chamber for storing a fluid.” Heat Transfer Unit 206 is a heat transfer unit and referred to as such in the specification and described in considerable detail. It is not a reservoir by any means. It is a chamber, but it does not store fluid. It is designed to direct as much fluid as possible over the surface of the heat transfer unit in thermal contact with the heat generating component (e.g. microprocessor) and over an area as large as the surface of the heat generating component, to absorb heat there from and then transfer the heated liquid to the

heat exchanger to be cooled. It does not store fluid since the fluid is constantly being circulated through it.

13. Similarly the input cavity 300 and the output cavity 312 shown in Fig. 3 of the instant application are not reservoirs either. They are clearly described in the specification and depicted in the drawings as an input cavity for receiving heated fluid and directing it to the liquid paths through the dissipater to be cooled and then received by output cavity 312 and directed by output cavity 312 to the system (e.g. the heat transfer units). An analogy from the automotive world would be manifolds; not reservoirs. As is clear from Applicant's figures and specifications, nowhere in the liquid cooling system of the instant application is any part or component used to store liquid (coolant). All of the liquid in the system is in constant motion circulating throughout the system and none of it is held in storage (which is the function of a reservoir).

14. With respect to the Examiner's third statement in par. 10 above, Applicant submits that the "two piece" language and description in the instant application (see par. 0027, and very clearly in paragraph. 0054, for example) is clear support for there being no reservoir. Applicant clearly describes what the 2 pieces are: the heat transfer unit and a heat exchange unit. (Note: The conduits are not normally included in this type of definition among those skilled in the art.) and nowhere is there mention of a reservoir. Throughout the specification, the operation of the liquid cooling is described in great detail and nowhere is there mention or depiction of a reservoir or any storage of liquid, since there is no reservoir. To anyone of ordinary skill in the art, this is obvious as are its benefits. Moreover, Applicant has very clearly taught in the specification how to build a liquid cooling system for cooling heat generating components in an electronic system without a reservoir. The advantages of a system without a reservoir are obvious to anyone skilled in the art, including: less chance of leakage; less power consumed; better convective flow; less liquid being used; better cooling performance, etc. All of this was pointed out in Applicant's Remarks previously submitted.

15. For all of the foregoing reasons, Applicant submits that the Examiner's rejections of these claims under 35 USC 112 is overcome. Furthermore, since the Examiner's subsequent rejection of these Claims under 35USC102 is based on the lack of consideration of the "no reservoir" limitation in the preamble of the claims and the body of the claims, and since Cheon '954 \ (and the other cited art) clearly have/use a reservoir, Applicant submits that these claims are now in condition for allowance.

16. [Note: In a subsequent section of the Examiner's final rejection, claims 54, 57, 58, 79, 80, 83, 87, 88 and 89 under 35 USC 112 were rejected because of the "self-contained" preamble limitation. All of these claims are multiple-dependent claims or depend on a multiple dependent claim. In each of these claims, one of the dependent claims on which they depend had a "no reservoir" preamble limitation as opposed to a "self-contained" preamble limitation. Applicant submits that, for the reasons stated in the preceding paragraphs above, any rejection under 35 USC 112 of these claims, to the extent they have a "no reservoir" preamble limitation, is also overcome.

Claims 73,74,90,91

17. These claims have been rejected under 35 USC 112 and 35 USC 103. Claims 74 and 91 have been cancelled and no discussion of them will follow.

18. Regarding the Examiner's rejection of these claims (73, 74, 90 & 91), the Examiner has stated "...the specification only contains a generic statement that the cooling liquid is a "propylene glycol based coolant". The propylene glycol base coolant is any coolant, which contains propylene glycol. The specification is silent about the propylene glycol being a base or about the water being added or about the relative quantities of said propylene glycol and water and other ingredients. Thus, the specification lacks the support for the subject matter recited in the claims."

19. A dictionary definition of the word “base(d)” is “the fundamental ingredient from which a mixture is prepared; chief constituent; a paint with an oil base”. Thus the word “based” is all that is needed to teach this invention. It means that propylene glycol is the base (or the majority or the fundamental ingredient), but not the entirety of the coolant and other additives can be added as desired for specific applications. Applicant’s invention is using propylene glycol as the coolant base in liquid cooling systems for cooling heat generating components in an electronic system.

20. Applicant submits that this (propylene glycol as the base) is not obvious as no one has ever done it. Goddard teaches propylene glycol as an additive, a very different use than as a base. On the other hand, telling one skilled in the art that propylene glycol is the base is sufficient to teach this invention. No further discussion or disclosure about proportions or additives are necessary as they will depend on the results sought after as anyone of ordinary skill would know.

21. The Examiner’s statement “The propylene glycol base coolant is any coolant, which contains propylene glycol” is in error. A person of ordinary skill will understand that the word “based” does not mean exclusively and does not mean as an additive. A dictionary definition of additive is “A substance added in small amounts to something else to improve, strengthen or otherwise alter it.” Thus the Examiner confuses the difference between “base(d)” and “additive”.

22. The Examiner’s statement “The specification is silent about the propylene glycol being a base...” is clearly erroneous. The Examiner in his opening sentence to this paragraph in the rejection clearly states “...the specification only contains a generic statement that the cooling liquid is a “propylene glycol based coolant”. Applicant agrees that this is a generic statement but points out that it is all that is required to teach one of ordinary skill the invention of using propylene glycol as the coolant base.

23. On pg. 8 (at the bottom of the page in Sect. 12.) of the Examiner’s final rejection, the Examiner has also stated “Regarding the Applicant’s arguments related to the propylene glycol,

the arguments are moot due to the rejection of the relevant claims under 35 USC 122, first paragraph.” Applicant assumes that the Examiner meant 112 and not 122. Applicant suggests that Applicant’s arguments herein have successfully overcome the Examiner’s rejections of these claims under 35 USC 112.

24. With respect to these claims, the Examiner has also rejected them “...under 35 USC 103 (a) as being unpatentable over Cheon ‘954 taken with US/4,610,222 to Goddard et al., (Goddard). Applicant believes that automotive coolant technology is not the same field of endeavor as coolant technology for heat generating components in an electronic system as the Examiner asserts but rather different fields of endeavor. The issues and problems an artisan is trying to solve are quite different. Notwithstanding that, it is clear, as the Examiner has admitted, that Cheon ‘954 does not in any way teach the use of propylene glycol in any manner and Goddard teaches the use of propylene glycol (in automotive application only) as an additive. As explained above, there is a major difference between a base and an additive. Applicant submits that the teaching the use of propylene glycol as an additive (in Goddard) is not remotely suggestive of the use it as a base and it would far from obvious to do so. Applicant has explained, in its Remarks submitted with the prior amendment, some of the reasons why it would not be obvious to do so.

25. The Examiner has also stated that with regard to “....method claims 90 and 91, the steps recited in the claims are inherently necessitated by the device structure as taught by Cheon modified by Goddard.” Applicant does not see how the use of propylene glycol as a base is “necessitated ...” Most liquid cooling systems for electronic systems use water as the coolant. Cheon ‘954 suggests the use of an “automotive radiator fluid as the coolant” and this can in no way necessitate the use of propylene glycol as a coolant base, irrespective of Goddard.

26. [Note: The Examiner has also rejected Claims 90 and 91 in Section 8, at pg. 5 of the Office Action as follows: “Regarding method claims 75-79, and 81-91, the method steps recited in the claims are inherently necessitated by the device structure as taught by Cheon ‘954.” Applicant has not addressed this rejection here as Applicants believes the inclusion of claims 90 & 91 in

this statement was a clerical error by the Examiner. These method claims were rejected by the Examiner under 35 USC 103(a) in a subsequent section of the final rejection and Applicant addresses that rejection subsequently.

27. For the reasons stated in the preceding paragraphs, Applicant submits that all of the Examiner's rejections of claims 73 and 90 have been overcome and these claims are in condition for allowance.

Claims 53, 56-58, 76, 78-80, 82-84, 86-89 and Claim 54

28. These claims have been rejected by the Examiner under 35 USC 112 and under 35 USC 102 as being anticipated by Cheon '954. [Notes: i.) Applicant assumes that the inclusion of claim 80 in this group of claims rejected by under 35 USC 102 is a clerical error as this claim is later rejected by the Examiner under 35 USC 103(a). Moreover, as noted subsequently by the Examiner, Cheon'954 cannot anticipate this claim by itself. ii.) With respect to claims 54, 57, 58, 79, 80, 83, 87, 88 and 89, and the Examiner's rejection of them under 35 USC 112, please refer to Applicant's Note in paragraph 16. above. Applicant's Remarks below with respect to these claims apply to portions of these claims which have or depend on a claim having the "self-contained" preamble limitation.

29. With respect to the Examiner's rejection of these claims under 35 USC 112, second paragraph as being indefinite, the Examiner has stated "... for failing to particularly pointing out and distinctly claiming the subject matter which the Applicant regards as his invention. The preambles of the claims recite that the cooling system having "a self-contained heat exchange unit." The term 'self-contained" renders the claims indefinite. The term is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree (i.e. degree of inclusion) and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is not clear what the heat exchange unit should include and/or exclude in order to be self contained."

30. Applicant has amended these claims and other relevant claims to clearly and distinctly point out what the Applicant regards as its invention. The addition of “installable as a single unit within the electronic system (or within the system)” in the preamble of these claims and coupled which a clear enunciation of what constitutes a self-contained heat exchange unit in the preamble or the body of other of these claims, clearly makes the “self-contained” preamble limitation clear (as opposed to indefinite) and clearly specifies in each of these claims what is included in the heat exchange unit to be “self-contained”.

31. The specification does provide a very clear standard for ascertaining the requisite degree (i.e. degree of inclusion) for one of ordinary skill in the art to be reasonably apprised of the scope of the invention. Throughout the specification (see paragraph 0054 and Fig. 3, for example) it is clear that Applicant’s liquid cooling system is comprised of two pieces; a heat transfer unit(s) and a heat exchange unit. Furthermore, it is very clear throughout the specification of the instant application that, except for the heat transfer unit(s) and the conduits (or other means of liquid communication), every component described is part of a “self-contained’ heat exchange unit. Furthermore, it is very clear, that in its simplest form, the “self-contained” heat exchange unit comprises an input cavity, a dissipater and an output cavity. If the pump, motor, drive shaft, impeller or even fan(s) are added, they are added as part of a single piece or unit (i.e. the “self-contained” heat exchange unit). There is ample and clear description throughout specification and the Figures for Applicant’s 2-piece system, including the “self-contained” heat exchange unit. It is also obvious to anyone of ordinary skill in the art, the many advantages of a “self-contained” heat exchange unit and some of these were described in Applicant’s Remarks submitted with the previous amendment.

32. The Examiner has also rejected these claims under 35 USC 102 as anticipated by Cheon ‘954. Applicant believes the rejection of these claims under 35 USC 112 has been overcome so that the preamble limitation of a “self-contained” is now applicable. Applicant finds no basis

for a specific 102 rejection of these claims with the self-contained preamble in the Examiner's specific comments in Section 8.

33. With respect to claim 54, Applicant believes that the Examiner's statement in Section 8 of the Office action "..., said heat transfer units (12, 30) and said heat exchange unit (42, 44, 46, 50) are deployed in a single unit (2), ..." are directed at Applicant's claim 54. Since unit (2) of Cheon '954 is the entire computer system, it cannot be anticipatory of a self-contained heat exchange unit nor the combination of the heat transfers units with the heat exchange unit into a single ("self-contained") unit for installation into an electronic system. Additionally, most of the heat exchanger of Cheon '954, as defined by the Examiner, is not into or in the computer or single unit (2) as the Examiner has stated. The Examiner has defined the heat exchanger unit in Cheon '954 as elements (42), (44), (46), (48) & (50). However, as clearly shown in Fig. 1 of Cheon '954 and as stated in Cheon '954 (e.g. col. 4, line 40; col.5, line 6; etc.), all of elements (42), (44) & (46) are outside the computer casing (2) and parts of elements (48) and (50) are outside the computer casing (2).

34. Consequently, for the reasons stated above, Applicant submits that the Examiner's rejection of these claims 53, 56-58, 76, 78-80, 82-84, and 86-89 (and claim 54) under 35 USC 112 is overcome. Since the Examiner has given no patentable weight to the claims 53, 56, 76, 82 and 86 (see page 5 of Examiner's final rejection) with respect to the "self-contained" preamble limitation and there is no anticipation of the "self-contained" preamble limitation in Cheon '954, Applicant submits that any rejection of these claims (56-58, 76, 78-80, 82-84, and 86-89 and claim 54) is overcome. Consequently, Applicant submits that these claims are in condition for allowance.

35. Notwithstanding any rejection of or objection to by the Examiner of claims 55-58, 72, 77-80, 82 and 84 as submitted in Applicant's previous amendment under Kropa v. Robie or 35 USC 112 or the Examiner's refusal to give patentable weight to the "no reservoir" or "self-contained" preamble limitations therein, Applicant submits that, since these claims all have an output cavity

as an element, they were allowable without the claim amendments made herein. The Examiner's attempted re-characterization or mis-labeling of what Cheon '954 calls a downstream portion (60) of the reservoir (48) as an "output cavity", notwithstanding, Cheon '954 does not have nor anticipate an output cavity as specified/described in Applicant's claims/specification. Please see the detailed discussion of this in paragraphs 40-44 below. Consequently, (and irrespective of the "no reservoir" and "self-contained" preamble limitations), Cheon '954 does not anticipate these claims.

36. As a result of the amendments made above to the claims, claims 53, 69, 76, 82, 86, and 99 in whole and multiple-dependent claims 54, 70, 71, 83, and 87-89 in part, now have an "output cavity" as part of the preamble or the body of the claim. Consequently, these claims are not anticipated by Cheon.

37. The Examiner has stated that, with regard to method claims 76, 78, 79, 82-84 and 86-89 above, the method steps recited in the claims are inherently necessitated by the device structure as taught by Cheon '954. Applicant disagrees with this rejection as Cheon does not anticipate a "self-contained heat exchange unit" and it does not anticipate an output cavity (see comments in the next section of these Remarks).

38. Consequently, as a result of the amendments to these claims and/or the reasons set forth above, Applicant submits that the rejections to claims 53, 55-58, 69-72, 76-80, 82-84, and 86-89 (and new claims 98 and 99) have been overcome and they are in condition for allowance.

Claims 59-65

39. The Examiner has rejected claims 59-65 under 35 USC 102 as anticipated by Cheon '954.

40. Claim 59 (on which claims 60-65 depend) recites the placement of a pump in the output cavity of the heat exchanger. Applicant has pointed out in the Remarks of its previous

amendment and in paragraphs 35-37 of these Remarks above, that Cheon'954 does not have an output cavity. The Examiner has stated that he found Applicant's Remarks unpersuasive. The Examiner has provided no basis or justification for this re-labeling and re-characterization nor has he rebutted Applicant's prior Remarks. Applicant respectfully submits that the Examiner is incorrect in trying to re-label the downstream portion (60) of reservoir (48) in Cheon '954 as an output cavity. Applicant is aware of no prior art which anticipates or suggests liquid cooling systems for cooling heat generating components in an electronic system having an output cavity as described in Applicant's specification and claims.

41. A closer look at the reservoir (48) of Cheon '954 which the Examiner is a component forming the "heat exchanger unit" of Cheon '954 is warranted. In Cheon'954, the reservoir (48) is divided into two parts by an internal wall (62); an upstream portion (58) and a downstream portion (60). According to Cheon, heated liquid passes through the upstream portion as it is being cooled and then passes through an opening (66) to collect in the downstream portion (60) before being pumped out of outlet (56). Downstream portion (60), thus is not an output cavity as described and claimed by Applicant, not does it anticipate or even suggest the output cavity (312) of the instant application, but is merely a significant portion of the Cheon '954 reservoir (48) and given a name to describe the flow of liquid through the reservoir (48).

42. In the instant application, there is, of course, no reservoir to start with. It has a dissipater with several distinct liquid paths (unlike Cheon '954) through it for cooling the heated liquid. It also has an input cavity (300) and an output cavity (312) which, act in a manner similar to manifold. The input cavity receives heated liquid and directs it to the paths through the dissipater where the liquid is cooled. The output cavity (312) receives the cooled liquid and directs it out to the liquid cooling system. Neither cavity stores liquid. On the other hand, the downstream portion (60) of Cheon '954 does not operate in this manner. Since it is part of the reservoir (48), by definition, its function is to store liquid.

43 Referring to Fig. 3 in the instant application, it can be seen that the input cavity (300) and output cavity are very small in proportion to the dissipater. The output cavity (316) in fact, is only as large as it has to be to accommodate the pump. The input cavity is even smaller. By contrast, in Cheon '954, the downstream portion (58) and upstream portion (60) of the reservoir (48) together constitute the entire Cheon '954 reservoir. Also, the function (i.e. storage) of the downstream portion (60) of the Cheon '954 reservoir 948) is not at all similar to that of the output cavity of Applicant's instant application. The Examiner has and continues to inappropriately mis-label and mischaracterize this portion of the Cheon '954 reservoir (48). It is obvious and explicit that Cheon '954 does not anticipate the invention of the instant application at all.

44. Since Cheon '954 does not have or even suggest an output cavity as described in Applicant's claims and specifications, Applicant submits that the Examiner's rejection of these claims 59-65 is overcome and that they are in condition for allowance

45. With respect to claim 60, the Examiner stated that Cheon '954 has " a motor (94) driven self-priming pump (50)... " [Note: Cheon actually labels its pump as (P) and not (50).] Applicant also wishes to thank the Examiner for his comments on pg 12 of the application noting that the Cheon '954 pump (P) is always submerged. Applicant believes that the Examiner is referring to Fig. 4 of Cheon '954 where it appears the Cheon '954 pump (P) is submerged, since there is no reference in the specification of Cheon '954 to the pump (P) being submerged or being self-priming. Applicant, in its prior comments about the Cheon'954 pump (P), was referring to the fact that, despite the appearance of the pump (P) being submerged in Fig. 4, because of its design as shown in Fig. 4, it would be impossible to fill the upstream portion (60) of reservoir (48) in Cheon '954 to a point where the liquid rises above the bottom of divider wall (62) because of lack of air displacement. Since the pump (P) is shown as being disposed in the upstream portion (60) of reservoir (48) at a point well above the bottom of divider wall (62), it couldn't actually be submerged and cannot be self-priming, notwithstanding the depiction in Fig. 4.

46. With respect to claim 61, the Examiner stated that the Cheon '954 "pump (50) is disposed at the lowest possible point in the heat exchange unit (42, 44, 46, 48, 50). It is impossible to place the pump at the lowest possible point, as long as the impeller is located in a vertical plane, as Cheon '954 depicts in all embodiments. Applicant clearly depicts its impeller in a horizontal plane at the lowest possible point in the heat exchange unit.

47. With respect to Claim 62, the Examiner has stated that Cheon '954 is driven by a motor (94) via a shaft (88), the Examiner has also claimed in Section 12 that Applicant has this claimed more broadly than we argued. Applicant wishes to point out that claim 62 is dependent and it does not see how it has over broadly claimed this claim. Additionally, Cheon does not have a drive shaft. It has a stem (86) which acts as an axis (not a drive shaft) about which the propeller (82) coupled to a magnet (84) rotates as Applicant pointed out in the Remarks of the previous Amendment.

New Claim 99

48. New dependent claim 99 has been added. It depends on claim 55 or 56 with a pump added and disposed in the output cavity of the heat exchanger unit. Applicant submits that new claim does not add new subject matter requiring further examination.

Claims 68-72, and Method Claims 81-89

49. All of the above claims relate to convective cooling. All of the above claims were rejected by the Examiner under 35 USC 102 as anticipated by Cheon '954 after the "no reservoir" or "self-contained" preambles were not given 'patentable weight" by Examiner (pg. 5 of the Office Action).

50. All of the above claims now have an amended preamble (or depend on a claim with an amended preamble) for a liquid cooling system having no reservoir or a liquid cooling system

having a self-contained heat exchanger unit. Applicant believes that it has overcome the 35 USC 112 rejections and the Kropa v. Robie (88 USPQ 478 – CCPA 1951) rejections of the Examiner with respect to these preambles and that these claims (68-72, and 81-89) are now allowable.

51. Additionally, as noted earlier in these Remarks claims 69, 72, 82, 84, 86, 98, 99 in whole and claims 70, 71, 83, and 87-89 in part have an “output cavity” which is not anticipated by Cheon’954.

52. Applicant again points out that the Cheon’954 specification is completely silent about convective cooling or the placement of inlets and outlets and never contemplated convective cooling with the system disclosed therein and cannot be relied directly or by implication as teaching convective cooling.

53. With respect to claims 68-71, 81-83, and 85-89, the Examiner has stated “...said heat transfer (contact) unit (30) having an inlet (34) positioned below an outlet (36)...” and “...said contact unit (30) transports heat from the heat generating components to the liquid, which rises in the cavity of said contact unit (30) (inherently due to convection....)” Applicant pointed out to the Examiner in the Remarks of its prior Amendment, that Fig. 2 of Cheon ‘954, which is the sole basis for the Examiner’s statement, is in the nature of a schematic diagram and cannot be used to teach the positioning of the inlet vs. the outlet. On pg. 8 of the Office Action, the Examiner has responded to Applicant’s prior Remarks as follows: “...In response, the Examiner would like to direct the Applicant’s attention to the fact that said Fig. 2 depicts the cooling liquid being drawn to the bottom of the reservoir (48) by gravity, and therefore it is possible to judge about the relative disposition of the inlet and outlet in a vertical plane. As shown in the figure, the outlet (36) is positioned above the inlet (34) and, therefore, the circulation due to the convection will inherently be taking place.”

54. Applicant thanks the Examiner for his observation but believes it is incorrect and no inference of convective cooling in the Cheon ‘954 heat transfer unit (30) can be made for the following reasons:

- a.) Cheon '954 states unequivocally that Fig. 2 is a "schematic flow diagram";
- b.) In the specification of Cheon '954 when describing Fig. 1 (see col. 4, lines 5-19), Cheon states that "...heat sink (26) has a flat horizontal top to which heat transfer device (30) is attached and opposite downwardly depending legs ... As with heat transfer device (12)...heat transfer device (30) has a flat, heat-transferring interface (32) with the top of heat sink (26)..." In Fig. 1 of Cheon '954, heat transfer device (30) is shown with its inlet and outlet in the horizontal plane. Hence no inference of convective cooling within heat transfer device (30) or a vertical placement of its inlet and outlet can be made.
- c.) The effects of "gravity" or anything else within in the Cheon '954 reservoir cannot be inferred to the heat transfer unit (30), particularly when Cheon says Fig. 2 is a "schematic flow diagram";
- d.) No inference on vertical placement of the inlet and outlet of the heat transfer unit (30) can be drawn from a vertical placement of the inlet and outlet of the Cheon '954 reservoir (48), because in Fig. 4 of Cheon '954, the same reservoir (48) and its inlet and outlet are shown with the same "assumed" vertical placement as in Fig. 2, yet heat transfer unit (30) is shown with its inlet and outlet in a horizontal plane;
- e.) The heat transfer device (30) is shown in Figs. 1, 2 & 4. In Figs. 1 & 4 it is shown with the inlet and outlet at the same vertical height;
- f.) The other heat transfer device (12) in Cheon '954 is shown Figs 1 & 2 only and in both cases the inlet and outlet are shown at the same vertical height; and
- g.) If the placement of the inlet (34) and the outlet (36) of heat transfer unit (30) in Fig. 2 were meant to depict physical placement, then why was the inlet and outlet of heat transfer unit (12) shown in the horizontal plane in Fig. 2, when it could have been shown easily in the vertical plane just by rotating device (12) 90° clockwise.

55. As noted above in paragraph 53, the Examiner stated, "...In response, the Examiner would like to direct the Applicant's attention to the fact that said Fig. 2 depicts the cooling liquid being drawn to the bottom of the reservoir (48) by gravity...". As indicated above, in the reservoir of Cheon'954, cooled liquid is supposedly forced downwardly in the downstream portion (58) of

the reservoir (48) and then, after passing under divider wall (62) through opening (66), upwardly past the outlet (56) and pump (P), in the downstream portion (60) of the reservoir (48) prior to being pumped out of outlet 56. This (upward) motion of the cooled liquid would oppose the forces of gravity and more importantly, would oppose any possible convective momentum created by the heated liquid as it is being cooled in the upstream portion (58) of the reservoir (48). Therefore, it is clear that the use of convective circulation of coolant was never anticipated by Cheon'954 nor would the disclosure of Cheon'954 lead one skilled in the art to this feature of the present invention.

56. The Examiner has also stated that "...Regarding method claims 75-79 and 89-91, the method steps recited in the claims are inherently necessitated by the device structures as taught by Cheon '954." Applicant submits that since Cheon '954 does not teach or even suggest convective cooling; places the inlets and outlets of the heat transfer devices (12 & 30) in a horizontal plane, and does not have an output cavity in its heat exchanger (contrary to the Examiner's assertion), the methods of these claims is not inherently necessitated by Cheon '954 irrespective of whether the no reservoir and self-contained limitations in the preambles of these claims is given patentable weight by the Examiner.

Claims 66, 67 and method claim 80

57. The Examiner has rejected these claims under 35 USC 103 (a) as being unpatentable over Cheon '954 taken with either US/5,323,847 to Koizumi et al., (Koizumi) or with US/6,313,990 to Cheon '954

58. All of the above claims now have an amended preamble (or depend on a claim with an amended preamble) for a liquid cooling system having "no reservoir" or a liquid cooling system having a "self-contained" heat exchange unit. Applicant believes that it has overcome the 35 USC 112 rejections and the Kropa v. Robie (88 USPQ 478 – CCPA 1951) rejections of the Examiner with respect to these preambles and that these claims (68-72 and 81-89) are now allowable.

59. With regard to claims 66 and 80, the Examiner has stated “... Cheon disclosed all, including a dissipater with fins (64), said fins (64) create non-laminar flow, (inherently), but did not disclose a fan.” As pointed out several times in these Remarks, Applicant asserts that Cheon ‘954 does not teach an output cavity, despite the Examiner’s mis-labeling and mis-characterization of the upstream portion (60) of the Cheon ‘954 reservoir (48). Consequently, Applicant asserts that Cheon does not “disclose all” but the fan and does not anticipate claims 66 and 80 (or claim 67).

60. Notwithstanding the above, Applicant believes these claims are allowable without either of the above stated preamble limitations and without regard to the output cavity that Cheon ‘954 does not teach or anticipate. The Examiner has stated that ”It would have been obvious ... to augment the efficiency of the cooling system.” The Examiner has totally ignored the following phrase in these claims “...and to dispel air from the electronic system housing.” Applicant is aware of no prior art where this has been done in a liquid cooling system for electronic systems and thus claims it would hardly be obvious to do so. Moreover, with respect to Cheon ‘954, since most of the Cheon ‘954 heat exchanger is disposed outside of the computer system housing, it would be hardly be obvious (as it wouldn’t make any sense) to mount a fan there. Cheon 990 and Koizumi do not teach or suggest the use of a fan to both enhance the efficiency of the cooling system and to dispel air from the housing thereof.

61. With respect to claim 67 which depends on claim 66, the Examiner has stated “... Cheon disclosed all, including a dissipater with fins (64), said fins (64) create non-laminar flow, (inherently),” While it may be that fins (64) create a non-laminar flow of the coolant liquid (Note: Cheon ‘954 is silent about this) if the system works (which Applicant has disputed) and this may be what Examiner meant, the fins (64) of Cheon ‘954 certainly cannot teach, inherently or otherwise, any non-laminar flow of air as they are encased in the Cheon ‘954 reservoir which is sealed. Claim 67 specifically refers to the non-laminar flow of air.

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62. The Examiner has also stated with respect to method claim 80, "...the method steps in the claim are inherently necessitated by the device structure as taught by Cheon '954 modified by either Koizumi or Cheon '990." For the reasons stated above, it is impossible for the device structure of Cheon '954 modified by any reference to "necessitate" the steps of claim 80. Consequently, Applicant submits that this rejection by the Examiner is overcome.

63. For all of the reasons specified immediately above, Applicant submits that the Examiner's rejections of claims 66, 67 and 80 are overcome and these claims are condition for allowance.

Conclusion

As a result of the foregoing, the Applicant asserts that Claims 52-73, 75-90 and 92-99 are in condition for allowance, and respectfully requests an early allowance of such Claims.

Should the Examiner have any further comments or issues or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at artfisher@sbcglobal.net.

Respectfully submitted,

Date: 6/20/05



Arthur W. Fisher
Registration No. 27,549

Patent Dominion LP
555 Republic Drive, Suite 200
Plano, Texas 75075
(972) 788-1336/office
(972) 788-1335/facsimile